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FROM ARCHITECTURE TO DESIGN:

A Comparative and Evaluative Study of Professional Practice

HATFIELD, ENGLAND

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ABSTRACT

This research considers the development of design practice over the last decades where a gap between practice and theory can be observed. Apparently, design education failed to follow the pace of change from practice. In this sense, this research tries to unveil the main aspects of design practice as a way of negotiating the gaps between practice and education. Different fields of design are analysed to identify the traits and characteristics that are broadly recognised by the design community.

In this context, practitioners arguably do not seem to be aware of the process in which they are engaged; in part, because their education does not provide sufficient knowledge about the design process and its methods, and in part, because of the lack of interest shown by designers in learning or observing their own activity. In this sense, I would include my own experience as an emergent designer where observing the practice and the design process emerged as essential for the development of my own work.

This study found that it is not possible to draw a generalized model of how designers work as their methods and techniques may vary. However, it is possible to identify some characteristics of the design process that can always be found especially regarding problem solving. Here besides the obvious areas of art and design, business and management also emerged as essential fields to the practice of design.

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1 INTRODUCTION

In *Architecture: A Story of Practice* Cuff (1992) observed architectural practice and systematised her findings into four key dualities that embody contradictions in the profession between the values held by the architect and the practice of architecture. First, there is the duality between the individual and the collective; second, the duality between architecture as decision making as opposed to sense making; third, architecture as design and art versus architecture as business and management; and fourth, the image of the architect as specialist as opposed to generalist. Although all these dualities exist simultaneously in architectural practice, they are sustained by the values that a community holds of what it is to be an architect.

Researchers in the field of design practice and design thinking frequently argue that the process of design is not mysterious and could be presented and studied by means of observing professional practice. (Cross 2011. Lawson 2006). On the other hand, designers themselves do not seem to be either comfortable or familiar with thinking about such processes. Nevertheless, the study of the design process matches my concerns as an emergent practitioner as it elucidates some of the main areas in which design education leaves something to be desired, as far as its relevance and applicability to professional practice are concerned. Some of my key

research interests are related to such gaps between professional practice and education with respect to the process of design. Apparently, design education fails to fully prepare designers for their professional role, whereas the design activity has gained in complexity during the last few decades, as increasingly many fields of knowledge need to be mastered in order to be able to solve modern design problems effectively. Professional practice involves multidisciplinary knowledge and transversal collaboration that does not frequently appear in design education. Therefore, it is essential to gain a deeper knowledge of the design process in practice in order to better prepare students for this new role of design, which is built upon several differents area of knowledge.

In this sense, the study of the dualities found by Cuff emerged as relevant points of architecture practice and matches my concerns as an emergent practitioner. My own experience shows that there are gaps between practice and education, as professional design practice rests upon many aspects of architecture/design that were barely mentioned (if at all) or overlooked during design education. The definition and understanding of the gaps between practice and education seems to be relevant to improve the formation of architects/designers with the skill set that will be required in their professional lives. This should lead to an improvement of the profession by meeting the requirements set forth by the new dynamic and multidisciplinary environment which designers now face.

This study will attempt to determine whether the same dualities that Cuff found in architecture in the United States can also be found in the field of design in the United Kingdom. This will be done by an analysis of specific examples of design thinking and practice in the United Kingdom. Unlike Cuff, who used ethnographic observation and interviews, this study will focus on content analysis and discourse analysis of books and articles written about the practice of design in the United Kingdom. Key examples of this method are evident in the work of Nigel Cross, Bryan Lawson and Donald Schön. Cross and Lawson are designers who have produced research about the practice of design in the United Kingdom over the last decade. Schön (1987) emerges as an essential reference since Schön's work is cited in the majority of texts about the design practice due to his research concerning the reflective practitioner.

From the first reading of texts about design practice it seemed evident that the process of designing holds dualities and unclear points as the designers themselves do not seem to be interested in demystifying the process. Unlike this mysterious way of seeing design activity, Cross (2011) and Lawson (2006) try to present design as a precise and clear process that entails well-determined phases. Although these authors clarify the process, it is possible to find a gap in the literature about the description of design. In this sense, the dualities found by Cuff emerged as main points of architecture practice. Considering architecture as a field of design, this

study will try to examine if these dualities can be considered in other fields of design in the United Kingdom.

The use of interviews with designers was considered at the beginning of this research, but subsequently discarded. The designer's discourse did not appear to be relevant to demystifying the design processes, as researchers in the field have stated that they are usually not aware of their own creative process or not interested in explaining it.

The study leads to the following research question: what is the perception of professional design practice as revealed in the literature written about design processes in the United Kingdom?

Here, a brief approach to the study of community values and cultural theory is helpful because it describes the relationship between the visible and the invisible domains of culture, and it gives prominence to the interface between these, that is, a distinct interface identified as 'statements', which transport the invisible 'values', 'beliefs', etc. into the domain of visible manifestations. Cultural forms of expression allow for registering, mapping and investigating cultural phenomena and, ultimately, cultural values. This is significant not only because cultural forms of expression illustrate underlying and otherwise inaccessible variables or elements that make up a culture, but also because they reflect back on the cultural phenomenon(a) and give indications of the nature of the cultural value(s) in question.

Clearly, culture as a concept leads to various interpretations and definitions. This work is not concerned about defining the idea of culture but

in how to identify symbol and values and then how to interpret a specific culture, that of the design community. This research considers the culture only as a psychological structure by means of which individuals — or groups of individuals — guide their behaviours in a certain context or community (Cohen 1985).

In 1978 Douglas Klegon wrote about the sociology of professions in order to identify how to differentiate professionals and non-professionals and also to understand the social significance of a professional occupation. Some consideration of this work may be useful to frame and analyse a professional community. In this case, his studies about the identification of profession will not be considered; rather, his approach towards the development of the social position and influence of an occupation will be treated. He argues that the development of the social position is due to internal and external dynamics. The internal dynamics consists of the efforts of practitioners to raise and maintain autonomy and influence. To do so, they have tried to organise themselves in professional associations in which they create codes of ethics, regulate the entry and determine levels of competency in an attempt to manipulate the social position of their occupation. On the other hand, the external dynamics are related to how the occupation gains and maintain**s** social significance. A historical approach to an analysis of the relationships between the occupation and economic institutions seems to be most appropriate (Klegon 1978).

The idea of community should be seen as a symbolic rather than a structural construct considering that the understanding of a community is about the minds of people and meanings attached to their thoughts, and about constituent social relationships of a community. Geographic or sociographical approaches should not be considered in this case. Thus, as Cohen argues, symbolism seems to be inherent in a community as way of giving and identifying meanings between the members of it. In the construction of a community demarcation of boundaries is necessary to establish the sense of self and its identity by emphasising traits and characteristics emblematic to the group (Cohen 1985).

In this sense Clifford Geertz's approach to interpreting a culture can be considered relevant. He considers anthropology as an effective tool to interpret a culture. He argues that the ideal observer should work within **his /her** culture to interpret another culture. The interpretation of a culture made by different observers may lead to totally different outcomes if the approach chosen is related to its own culture. So it is important to consider that each culture has its own semiotics and the consideration of each leads to a more precise interpretation (Geertz 1973).

This research comprises five chapters. Chapter 2, 'Methodology', briefly describes the method used in this research and why it was chosen as well as presenting a short description of the sample chosen. Chapter 3, 'Reviews', includes a review of four seminal books by the authors previously cited: Dana Cuff, Bryan Lawson, Nigel Cross and Donald Schön. These

works make up the main resource for the study. Chapter 4, ‘Discussion’, discusses the extent to which the dualities found by Cuff can be considered in other fields of design as a way of determining important values of design practice. Chapter 5, ‘Conclusion‘,provides the answer to the research question. The limitations of this study as well as topics for future research in the field are included.

2 METHODOLOGY

2.a Theoretical framework

Cuff serves as the starting point for this research. However, other sources emerged as key points of reference. The aim of this study is to discover if the same disjunctions found in architecture by Cuff can be considered in other fields of design. The research question considered is: What is the perception of professional design practice as revealed in the literature written about the design process in the United Kingdom? The sample chosen consists of texts about the design process written mainly by designers. Cross and Lawson's texts address the practice of design in an accessible way as they describe the activities and thoughts that underpin design activity. The reflection in action idea introduced by an analysis of Schön brings into consideration important aspects of the designer way of talking and contributes to determining the main aspects of the practice of design.

The sample chosen comprises broadly representative examples of the practice of design, especially in the United Kingdom. Nigel Cross and Bryan Lawson were the designers chosen for the first part of the analysis as they have both undertaken important research in the field of design over the last decade. Unlike Cuff, Cross and Lawson write more about the design

practice in the United Kingdom — preferable for this research — while Cuff writes about the practice of architecture in the United States.

The only work analysed that does not talk exclusively about design is Donald Schön's study about the reflective practitioner. Although this work does not deal only with design and it is not as recent as the other studies, it was deemed vital as it was always a component part of the studies analysed. The concept of reflection in action appeared as essential in building the image of the design practitioner. In this context, literature textual analysis is the field chosen with respect to methodology.

2.b Methods of analysis

The research method considered in this research was content analysis. It is a qualitative research method used by researchers to identify meanings, concepts, symbolic qualities and the culture and time inherent in the collection of data. As a technique it arguably involves procedures that ensure research reliability. It can be replicated by the use of a set of procedures that involve sampling, reading and analysing a certain data.

The choices of the type of content analysis as well as the way of managing its main components are essential to obtained reliable research. Content analysis starts with a framework that can make the role of the research clear. Krippendorff (2004) suggests that a framework has some conceptual components: a body of texts, a research question, a context of

the analyst's choice, an analytical construct, inferences that are intended to answer the research question and a validation of the evidence.

Here it is important to describe the role of the research question as it is responsible for delineating several possible and uncertain answers. Content analysis starts with a research question that should be formulated such that the answers can be broadly validated and the content analysis protected from getting lost. As Krippendorff (2004) noted:

> 'For example, the question of how frequently a particular word occurs in a text can be answered by counting. Counting is what analysts do. Counts cannot be validated by independent evidence; to assure that counts are correct, analystis must repeat them, perhaps emplying different persons or counters. The same is true for questions concerning wheter one can categorize, measure or analyse some questions.' (Krippendorff 2004,p. 32)

He goes on to argue that some components of all types of content analysis are essential and must be considered: unitising, sampling, recording / coding, inferring contextual phenomena and narrating the answer to the research question (Krippendorf 2004, p. 83). It is worth taking a brief look at these concepts. 'Unitising' consists of deciding what kind of data is best suited to be observed in an analysis and how the observations are going to be realised. 'Sampling', in turn, is a tool that optimises the research by designing a particular frame to be analysed that will make the research operable. The analysis of a representative sample usually obtains the same conclusions as the analysis of the whole data. 'Recording' is the component that has as its function keeping the observations done in a body

of research suitable for future examinations. Such examination is done by interpretations of images, readings, speeches, or any other kind of data analysed in order to ensure that the research discoveries will be available for others research findings. ‘Inferring contextual phenomena’ is what moves the content analysis outside the data by inducting meanings, causes and relations interesting to the analyst.

Content analysis appeared to be the ideal method for this study as it enables us to discover what designers think are key elements and then identify whether the disjunctions found by Cuff about architecture are present in the writings about design. Also, the biographical dimension is visible by means of this method, i.e., I am looking at designers writing about design.

2.c Materials (authors)

It is worth reviewing the key positions of Dana Cuff, Nigel Cross, Bryan Lawson and Donald Schön.

Dana Cuff is an architect and research teacher at UCLA (University of California at Los Angeles) and emerged as a relevant source in the primary research due to her approach to architecture practice. In her book *Architecture: A Story of Practice* (1992) she brings relevant aspects to the practice of architecture. The work provides a complete of architecture activity as it examines different aspects from the education of architects to the practice of experts. She identifies not only the main characteristics of architectural practice, but also the problems related to it.

Nigel Cross has undertaken important research into methodology and epistemology of design in the United Kingdom over the last decades as well as into previous practice on architecture and design. His work is extensively cited in recent studies about the design process in the United Kingdom. Considering this research tries to reveal if the same dualities found by Cuff in architecture can be considered in design, Cross's work appeared as a reading that might contribute to the research as his most recent book, *Design Thinking,* treats some of the most important aspects about the design process.

The choice of Bryan Lawson came through a reading of Cross as both talk about each other's work[1]. He also presents a relevant work about the design process in the United Kingdom. In *How designers think* (2006) he presents the main characteristics of the design process bringing a relevant analysis about the design process. Besides, like Cuff, he treats aspects of practice and education.

Donald Schön's ideas about the reflective practitioner emerged as essential to this research as his works were cited for the biggest part of the sources consulted in this study. It is important to say that his work will be analysed in a different way to others reviewed in this study because his research is not exclusively about the practice of design. Furthermore, only aspects relevant to the practice of design will be considered.

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[1] Cross 2011, p. 13, 14, 15, 30, 70, 71, 78, 146, 148.
Lawson 2004, p. 17, 28, 59, 60, 65, 88, 91, 93, 95, 104.

3 REVIEW OF THE SAMPLE

This chapter consists of a review of four arguably seminal books about the design process. They were chosen not only for their content, but also for the authority of their authors in the field of design practice. As mentioned in the introduction, Cuff (1992) was the starting point for this research and for this reason her book *Architecture: A Story of Practice,* is the first one reviewed. It will elucidate important aspects of the practice of architecture as she analyses the profession from students in the studios to the practice of experts and seniors developing successful projects.

The second and third reviews are about the practice of design. Nigel Cross and Bryan Lawson were the authors chosen to be analysed due to their credibility concerning research about design practice in the United Kingdom. They are both designers, which gives them a closer perspective on design activity. They also use similar methods to describe design activity, which include analysis and discussion of the process of design through the exposition of cases. Cross uses observation and analysis of design cases developed by experts while Lawson uses not only observation of design cases, but also situations he brings from his experience as a design teacher.

The fourth review is about the reflective practitioner presented by Schön. It seemed essential to include his thoughts as the ideas about ‘reflection in

action' [2] developed by Schön are extensively cited in texts about design practice. Though neither the idea of the book chosen nor the concept of reflection in action refers exclusively to the design field, the text highlights values and ideas held by the practitioners during the design process. One of the case studies used to describe and analyse the reflection practitioner consists of the development of an architecture project with the supervision and help of a tutor.

After a review of these books, the following chapter will analyse their analysis to reveal if the disjunctions found by Cuff in architecture can be extended to other domains of design.

3.a Review of Dana Cuff

Dana Cuff is an architecture professor at UCLA and a practitioner. In *Architecture: A Story of Practice* (1992) she analyses the architect's everyday work and examines the multiple interactions that shape an architectural project. Instead of ideology, beliefs and a mythical view of the architect as a single artist—and his or her work as an art free of judgements—she investigates the practice and reveals architecture as a collective and complex profession. She states that after years of practice, architects still say that their profession is an artistic activity, where art and creativity are the main components. On the other hand, her analysis of practice shows the

[2] Reflection in action as defined by Schön is an ability of professionals to talking back with the situation whilst managing a problem. (Schon 1987, pp. 100-105)

daily work of an architect to be rational and the architecture's heritage allied with the fine arts as less important to the daily events of the profession.

She also argues that this disjunction can be justified, in part, by the way that the profession discourages and promotes certain attitudes, such as rationalising in practice daily events. In their everyday work architects face new issues that are not considered during their education. In addition, other professionals do not seem to be interested in admitting these new tasks but only in keeping the idealised image of the profession. According to her, this contrast between what professionals say or believe and what they do is common. When describing the view of an architect or a partner in an architecture studio, Cuff notes that his view of the profession is typically linked to the idea of architecture allied with the fine arts. On the other hand, she observes his/her description of the actions that he/she needs to take in the studio seems to be closer to a business office rather than an art studio (Cuff 1992, p. 20). Besides art, architecture involves deadlines, organisation, regulations, and budgets and the role of the client is always also part of the design activity.

She states that the dualities between beliefs and practice are common in different areas and might reduce professional effectiveness. In architecture and design, the relationship between art and business is one of the best ways of illustrating the contradictions inherent between espoused theories and theories in use. She curiously states that though business is not really considered by the academy, it is an express activity in the practice

of architecture. In this sense, she considers the relationship between business and art to be one of the main dualities found in architecture practice. As in many other professions, architects try to find recognition of their work in their community, with their professional colleagues. Cuff (1992) asserts that art is an instrument used by architects so as to keep their discourse understandable only within their own community and out of public dissemination. She partially constructed this argument in analysing the conclusions drawn from a series of interviews made by Boughey (1968, cited in Cuff 1992, p. 22) for his dissertation. He discovers that art is used as a defence by architects as it allows for mystery and complete autonomy, thus protecting professionals against judgements and dissatisfactions (Cuff 1992, p. 22).

Some implicit characteristics can be identified in the discourse led by architects. Self promotion and the belief stated by the ethos can be considered the main implicit characteristics found in their discourse. In this sense, self-promotion seemed to appear when architects knew that the interview would be publicly available. They started to focus on the success of their production, leaving the process of the project hidden. Cuff states that as the uniqueness of their solutions is considered as an issue between the practitioners, they believed that keeping the process hidden would help to protect their unique way of solving problems and reaching good solutions. She goes on to argue that these kinds of attitudes and actions are linked to a system of professional beliefs that are rarely challenged and not always

correspond to real practice. She notes:

> ‘I suggest that certain attitudes and actions are tacitly justified by a system of professional beliefs - an ethos - that is rarely challenged. This can create problems in architectural practice when the ethos no longer corresponds effectively to everyday circumstances. (Cuff 1992, p. 21)

One of the most important points of Cuff’s research is the comparison between design problems presented in practice and the ones presented in the academy and in the professional societies. She uses content analysis—qualitative methodology for studying and examining words or phrases within a wide range of texts—in her field work to clarify these differences. One specific case was relevant, namely, a meeting in a college about the campus planning in which the participants included the college president, campus administrators, a lawyer, a fundraising officer, the chairman of the architecture department and architects. She compares the way problems are presented in real practice to the way they are presented in architectural schools and in the American Institute of Architects. Here, it is possible to identify main differences in the way the problems are presented in each. She shows that the problems in practice are more uncertain and complex than the ones presented by the academy or by the professional society and demand that individuals work in a group and not individually, as is usually the ideal (Cuff 1992, p. 63).

She affirms:

‘The activity of design (as in design process) is commonly thought to be what designers do, alone, at the drawing board. It is this second sense of the term, referring to the activity, that I would like to reconsider. Temporarily suspended the common definition, and imagine instead that every that every individual with a voice in design process is a kind of designer - the client, the engineer, the contractor, the inhabitants, the college president, the fundraiser, and so on. The architect-designer, among these individual, has the added responsibilities of coordinating all contributions and giving them some spatial expression. Design, then, is taking place whenever any of these actors makes plans about the future environment. While those actors may not sketch their concepts into architectural form, their input will frame design solutions. Moreover, it is from the context of all their interactions that a building emerges.’(Cuff 1992, p. 61)

Cuff’s analysis about design problems identified six most common characteristics, which she describes as: ‘design in balance’, countless voices, professional uncertainty, perpetual discovery, surprising endings and a matter of consequence. She analyses each of them, comparing the problems presented in schools and professional organisations (Cuff 1992 pp. 62–68). She goes on to argue that during an architect’s training, schools typically prepare architects to solve problems and identify what constitutes a problem and a good design solution. In this case, the greater part of this learning takes place in a studio where students spend considerable hours confronting and solving design problems. According to Cuff’s analysis in the United States, design is usually taken as an isolated activity in these studios, where problems are simplified and idealised and the external forces (clients, consultants regulatory agencies) are ignored. On the other hand, the professional organisations, in the case of Cuff’s study the American

Institute of Architects (AIA), provide manuals that guide the architect in dealing with the legal and professional issues encountered in the practice. Both models present diverge in several ways and concerning the problems presented in practice (Cuff 1992, pp. 63–68). Therefore, the following paragraphs will explore the six characteristics of design problems in practice and the differences between those found in schools and organisations.

The first characteristic is called ‘design in the balance’ and it consists of the difficulty architects find in balancing business and art. This difficulty emerges when the freedom in which architects prefer to develop their projects is challenged by the constraints presented by the clients. She goes on to argue that it is essential for the architect to learn how to manage these constraints efficiently and with a consideration for budgetary constraints. Besides being seen as an art form, architecture is also a profession and a business. For this reason, many offices have teams of professionals dedicated specifically to business development that are often isolated from the teams that work with the projects. Cuff observed that it was common practice to sabotage the business developer’s goals as a way architects found to reinforce the notion that business cannot understand architecture. Architects believe that this isolation would give them more independence. The intention might have been to protect design priorities from economic forces. This idea of separating art from business has a long tradition and is simply not found in architecture courses. There, projects are developed with a concern for a good design solution. Architecture students do not learn how

to achieve design quality within the context of opposing forces. The AIA contributes to this separation of art and business as it doesn't explicate the role of business on an architectural project (Cuff 1992, pp. 68–72).

The concept of 'countless voices' is the characteristic by which architecture is developed through the relationship with clients and other external voices.

Architects' decisions during a project are influenced by external determinants, such as social and economic forces. These forces can be considered participatory in the design process. They include not only the clients, but also regulatory bodies, other professionals called to contribute in specific issues of the project, city councils and so on. Cuff suggests that the architect's office should work to coordinate all these voices in managing the influence of each one of them (Cuff 1992, pp. 72–76). In this sense professional organisations and schools do not collaborate as both emphasise the individuality of the architect. In practice, this image of the architect as a single individual working in a studio does not exist. Cuff describes some passages of the AIA Handbook wherein architecture is taken as an art, and, as such, interaction between the client and the architect is little needed. In academic studios the same approach is taken as the students have individual experiences while developing a project. The exercises presented by the architecture courses simulate the role of the clients as a manageable and simple relationship (Cuff 1992, pp. 76–84).

The idea of what Cuff describes as 'professional uncertainty' is the

characteristic of architectural practice concerning an activity that involves uncertain responsibilities and procedures. This element of the profession is the opposite of the pragmatic activity, which is stressed in the academy. Often experts in specific areas of design work as collaborators on a design project. The determination of a leader becomes important as the client and collaborators began to work together on a project. The leadership assumes the role of defining the sequence of actions to be completed and the main goals. In the academy, this uncertainty is avoided. The academic problems are simple and do not mirror reality as only one problem should be solved at a time. Typically only one person gives feedback to the process and the conflicts and changes largely do not exist. The AIA acknowledges that different forces are involved in the project and that management is important. The AIA Handbook states:

> ‘Experienced owners understand the importance of constant communication, the need for clear and unambiguous decisions, the dangers of excessively revising decisions already made, the importance of writing things down, and the value of strong finance management and predictable cash flow for all concerned.’ (Cuff 1992, p. 90)

Although the AIA considers other aspects of the design problem, they consider the architect to be the manager, insisting that the architect can conduct the process alone. In the manual, the procedures and situations of architectural practice are identified as being clear in purpose and manageable and the architect works always from a central and strong

position. The external forces and participants are cited - as shown in the passage above - but the architect is still the person responsible for managing the whole process (Cuff 1992, pp. 84–91).

The fourth characteristic related to design problems is the concept of ‘perpetual discovery’. It considers the project of architecture as an endless activity. The act of design can potentially be endless and it is important to the architect to negotiate with clients and other participants in the process. Every project contains a high number of relevant issues. Thus, determination of which issues are negotiable and which are constraints might help the architect to control the situation (Cuff 1992, p. 92). According to Cuff, the AIA considers design to be a linear process. Most architects consider the same phases presented by the AIA, which are: schematics, design development and work drawings. The difference between practice and the AIA manual consists in the way these phases are applied. In practice, it is not always clear when each phase ends or begins and this is usually linked to client approval. In the AIA manual, the sequence of the phases is clear. On the other hand, this characteristic is well presented to architecture students, who are encouraged to rethink solutions. Architecture schools consider the development of the problems to be open-ended and the deadlines to be arbitrary (Cuff 1992, p. 95).

The notion of ‘surprise endings’ is the fifth characteristic of architecture problems described by Cuff. It implies that a project does not have an automatic solution; therefore, its outcomes cannot be predicted. The search

for the right solution and right way to explain and present an issue to the client is part of the process; however, the architect cannot always predict that surprises may occur in the construction or even the planning of a building The AIA and other professional organisations avoid this subject of having surprise endings and usually protect their professionals by removing the responsibility of such surprises. In academia, discovery of the unexpected is largely accepted and encouraged. Cuff argues that, on the other hand, it is important to consider that problems in academia and in practice are different, considering that academic problems are simplified and almost free of constraints, which brings more possibilities and surprises than in practice (Cuff 1992, pp. 95–101).

The last characteristic of architecture problem, ‘matter of consequence’ affirms that the architectural profession is represented by other stakeholders besides the architects (Cuff 1992, pp. 101–107).

Here, it is important to highlight that Cuff’s studies of the AIA manuals cited above were made in 1992. The current AIA manual has undergone several changes and in the very first sentences it consider the importance of business in the practice of architecture nowadays. Accordingly, Cuff’s analyses can be considered relevant as some of his assertions are now pointed and considered by important organisations, such as the AIA.

Besides the characteristics of design problems presented above another relevant point in Cuff’s studies is her analysis of three successful projects (Monterey Bay Aquarium by Escherick Homsey and Davis, Bergren House

by Morphosis and San Juan Capistrano Library by Michael Graves) each of which reveals some common aspects of good practice.

Cuff shows that the first relevant aspect in the three projects is the relationship and intense interaction between clients and architects as contributors to the project. Good solutions were achieved when architects and clients discuss and develop the projects together as a team. Uncertainty was also presented as a common characteristic to the development of good buildings as it enables the addition of relevant ideas that were not considered at the beginning of the project. In this sense, open-minded and flexible clients contribute to the good development of the project. Cuff says that good buildings are not developed by a single architect but by a team of professionals. The process of designing in groups was essential in the buildings analysed by her as: ‘the final project was the consequence of a team of exceptional individuals who have developed an appropriate means of working together in a project that holds potential’ (Cuff 1992, p. 234).

From the analysis of these three projects, she concluded that flexibility was an essential characteristic of the design process. It was possible to achieve not only a good relationship between the members of the architecture team, but also through a good relationship between architect and client. The aspects presented in this part of Cuff’s research confirm the main characteristics of design problems and for this reason were not extensively reproduced here.

Cuff argues that this process generates four main dualities that create new dilemmas in architectural practice. They are tensions between the individual and the collective, the processes of decision making or sense making, the imperatives of design and art versus business and management and the needs and insights of specialists and generalists (Cuff 1992, p. 247). The first duality is the 'individual and the collective'. It can be understood as the way architects as independent practitioners work in relative autonomy. Although designers always have a key position in the project, it is important to recognise that individuals act in the context of a larger social environment in which other forces are part of the process (Cuff 1992, pp. 251–254). The 'decision making or sense making' duality, Cuff asserts, concerns the anxieties about decision making by the architects. It should be replaced by the sense making which considers 'collective context in which we must make sense of a situation, inherently social, interpret it, and make sense with others through conversation and action to reach agreements'. The third duality, 'design and art versus business and management', is considered by Cuff as detrimental to the practice as business is an important part of design and must be considered part of the design activity. She argues that a successful project is not only the result of good design ideas, but also good decision making, good organisation of the work and an effective management of the budget available. In this classic schism between art and business, Cuff suggests that it be bridged using a variety of strategies. The main one is the addition of business and

management to education. Cuff considers the duality generated between specialists and generalists as constituting a debate among training professionals with specific or general knowledge. The education should provide a broadly based preparation. In the United States specialisation in architecture is usually acquired through years of practice instead of continuing education. Cuff suggests programmes that would continue education and thus decrease the gap between practice and education (Cuff 1992, pp. 255–258).

Cuff concludes that architecture is a social process in which a basic task of an architect is to interact with all participants. In this sense, the dichotomies found in the architectural scene, cited above, produce bad consequences to society and the architects as they reduce the effectiveness of design.

Considering that the dichotomies presented produce bad consequences for design activity, Cuff defines the main features of architecture that should be changed to promote the development of design. The changes proposed by her consist of the adequacy of design practice to design education. Design education should be based on practice and provide opportunities for students to face problems with more similarities to the one met with in practice. In addition, she reinforces the idea that academia and professionals should recognise architecture as a collective and ongoing activity (Cuff 1992, pp. 260-263).

It is expected that the analysis of Cross, Lawson and Schön's works will elucidate which of those aspects of Cuff's have remained relevant since the 1990s. Furthermore, these analyses will be compared considering the four dualities found by Cuff as a way of discovering which aspects of architecture can be found in other areas of design.

3.b Review of Nigel Cross

Other researchers present approaches to the practice of design similar to the one presented by Cuff (1992). In *Design Thinking* (2011), Nigel Cross identifies some common aspects of different fields of design in the last decade. His texts on design can be considered broader than Cuff's in the sense that his studies are not about only one field of design but about several, including architecture, product design and engineering. On the other hand, similarities can be cited between his and Cuff's conclusion about the main issues that design activity holds.

Cross (2011) took different approaches to reveal what he calls 'Design Thinking'. Here the analysis and observation of the designer's discourse and practice appeared as the most relevant. When analysing the designer's discourse, he used the analysis of research based on interviews of renowned designers.[3] Cuff (1992, pp. 20-22) argues that designers talk about their work in a mysterious way, in which intuition is cited as an

[3] Many aspects of design thinking that Cross found were derived from interviews concerning Robert Davies and Bryan Lawson. Robert Davies interviews were with members of Royal Designers for Industry (RDIs), an elite body of British designers and Bryan Lawson interviews were with an international group of leading architects.

important characteristic to their work. Designers define a big part of their work process as being natural, unconscious and, in this sense, they call it intuitive, omitting any need for rational explanations. However, according to Cross (2011) what designers see as intuition could be derived from the larger background experience they have acquired in design. He argues that we respond intuitively to situations that are familiar to us (Cross 2011, pp. 9–10).

Another characteristic found in the interviews analysed by Cross was the importance of sketching and drawing. It was presented by many professionals as way of thinking about and developing problems and solutions, as shown in the passage:

> ‘There is a cognitive limit to the amount of complexity that can be handled internally; sketching provides a temporary, external store for tentative ideas, and supports the ‘dialogue’ that the designer has between problem and solution.’ (Cross 2011, p. 12)

‘Developing the problem’ was also a common characteristic of the way designers think. Designers say that the development of the problem given is essential as the design brief is just the beginning of an exploratory process. Cross argues that though the recognition of designers is usually based on their solutions, successful designers are the ones capable of finding the right problem. Designer Kenneth Grange, to whom Cross is heavily indebted in his own work, also shows this face of design thinking in stating that sometimes the designer needs to ‘fabricate the problem’ (Cross 2011, pp.

64-66). What Grange wants to show is that his starting point is a fresh perception of how to frame the problem and so a new concept to it, from which he considers being his starting point for the process of designing.

An emblematic phrase by the architect Denis Lasdun, highlighted by Cross, summarises this idea:

> ‘Our job is to give the client, on the time and on cost, not what he wants, but what he never dreamed he wanted; and when he gets it, he recognises it as something he wanted all the time.‘ (Lasdun, cited in Cross 2011, p.3)

Another approach presented by Cross is analysis of what designers do. In this case he analysed other researchers’ work, such as Larry Bucciarelli, Diane Murray and Donald Schön[4], and presented two study cases: the work of designers Gordon Murray and Kenneth Grange. He demonstrates that successful designers exhibit several similarities in their way of design. The first similarities found were personal motivation and the courage to take risks. Gordon Murray’s car design was particularly relevant to illustrate this characteristic. Gordon Murray is a leading designer who worked in Formula 1 and had his work widely recognised due to his innovative ideas and solutions with respect not only to the design of racing cars but also to new concepts of how the team should work. Murray highlights the constant pressure created in the field of race cars as it is the kind of design that involves financial, human and technological demands at high levels.

[4] Schön’s work is presented and analysed in chapter 3.d of this research.

Therefore, the results expected are also high. Creativity and innovation, added to commitment and courage, were found to be essential to his success in this design field (Cross 2011, pp. 31–51).

Besides personal characteristics—motivation and the courage to take risks— other similarities can be identified in all the designers studied by Cross. The development of the problem is one of them. The way problems are presented appeared as the beginning of an exploration process in which designers should analyse and study the problem before starting to explore solutions.

Three key strategic aspects of design thinking are identified by Cross that are common in his case studies: (1) taking a broad system approach to the problem rather than accepting narrow criteria, (2) framing the problem in a distinctive and sometimes rather personal way, and (3) designing from first principles (Cross 2011, pp. 75–77).

Cross argues that the first key strategic aspect—taking a broad system approach to the problem—is related to the way designers face a design problem, in which they usually see details and external issues that might help the progress of the project. Gordon Murray's concern to reduce the time of each pit stop in Formula 1 racing is a good example of this strategic aspect. It shows his broader view of the problem, not focusing only on the design problems that were obvious to all the other teams. He was always concerned about the development of the team as a whole and tried to find solutions to help win a race and not only about solving each design problem

that involved the car design itself. Murray introduced the pit stop as a routine feature, which helped in the development of a lighter and consequently faster car. To achieve this Murray needed to calculate the time it took for each pit stop. At the end he devised a new solution, which was a new system to refuel the car that succeeded in achieving the main goal of the team, namely to win a race (Cross 2011, pp. 40–41).

The second strategy—framing the problem in a distinctive or personal way—involves the personal approach each designer takes to frame the problem presented. Kenneth Grange's approach to designing a sewing machine for Frister & Rossman is a good example of a personal approach. He took as his starting point the way people operate the machine and not the way the machine would look. His personal approach was functional as it emerged from the way people would interact with the machine and how the design of it could make the use of the machine more simple and pleasurable. The first aspect that he explored was the central location of the mechanism in the base. He observed that it did not appear to be the most appropriate as the user needed a bigger surface on which to work. The outcome of this approach taken by Grange was a new asymmetrical layout. The design stemmed from his concerns about the quality of the operation of the machine, and it was not a simple matter of shaping and restyling. This case demonstrates how designers approach a problem in giving help and guiding the structure of the design concept.

The third aspect—design from first principles—entails the way designers rely upon what can be identified as basic starting positions in the design process. Designers appeared to operate on the basis of first principles concerning the origination and development of design problems. An experiment by Victor Scheinman illustrates how first principles appeared to guide design projects.

Figure 1: Sewing machine developed by Kenneth Grange for Frister & Rossman. (Cross 2011, p.57)

The experiment consisted of a protocol analysis in which a short design exercise was given to Scheinman. He was asked to express his thoughts out loud so that the design process could be recorded. His design problem was the creation of a device that would enable cyclists to carry backpacks

on mountain bikes. His previous experience in riding a bike and a short research project about the subject led him to think about the stability of the bike as a main issue. From his concern about the stability of the bike he framed and developed his concept. As in all the other case studies presented by Cross, the use of first principles led these designers to reach their goal. Cross (2011) argues that innovative design derives from a conflict between the designer and the client. The existence of a conflict stimulates creativity and good designers seem to be always seeking a new stimulus. In this context the criteria of the client must always be kept in mind and respected so as to achieve a good design solution (Cross 2011, p. 77).

The following model summarises these similarities in design thinking showed by Cross:

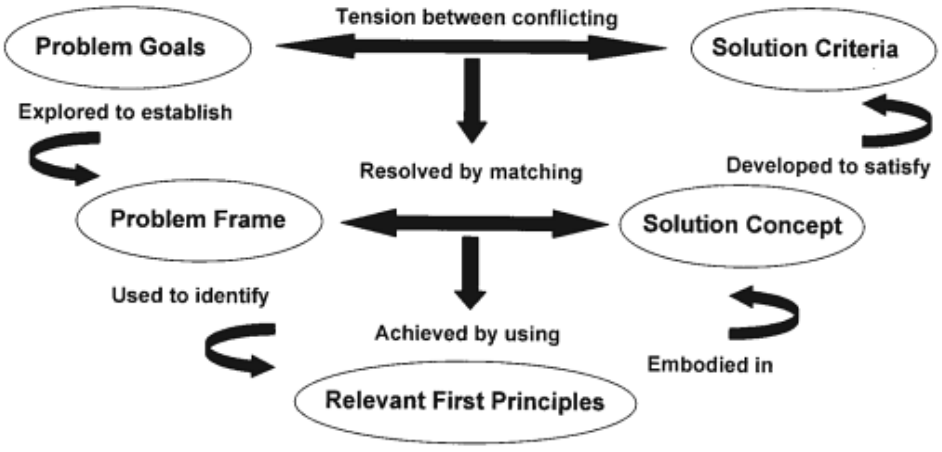

Figure 2: A model of the design strategy followed by all creative designers studied by Cross (in Cross 2011, p. 78)

Though the design strategy of successful design is usually similar and follows the model above, working in teams brings new considerations to the

design process. Members of a team should share a commonly held understanding of the problem. This might bring into play a larger number of concepts, and, at the same time, it might generate conflicts. Cross considers the idea of teamwork as a collaborative process in which the interactions between the designers creates a social process in which each member brings new perspectives about the problem. When these new perspectives are analysed and used to reach a good solution to the problem, this variety of ideas might help the process. On the other hand, many ideas can easily distract the team using them to discuss secondary problems. To avoid distractions it is important for a team to establish rules and goals focused on the final design solution (Cross 2011, pp. 91–114).

He concludes that when confronted with a design task, designers might go on forever gathering information and data about a design problem. It is important that designers be aware that problems are ill-defined and should be changed as given. Non-experienced designers might explore the problem too much before starting to develop a solution, which might make their process nonproductive. He goes on to argue that, in this sense, experts provide a broader and more complex understanding of the situation. They usually work with conjectures about early solutions as a way of exploring and defining a *'problem-and-solution'* together (Cross 2011, pp. 121–135).

It could be inferred from Cross' analysis that good design solutions are a consequence of a well structured problem development, not only of being

able to find a solution to a given problem. In this sense, design education usually focuses on solutions, missing the importance of a proper development of design problems. Apparently, the skill of simultaneously developing a problem and finding solutions for it is obtained through experience and reiterated practice.

3.c. Review of Bryan Lawson

Bryan Lawson presents another relevant research position about how designers have worked in the last few decades in the United Kingdom. As with other researchers analysed in this chapter, he also demonstrates the difficulties designers encounter in talking and thinking about their work.

In *How Designer's Think* (2006) Lawson suggests that analysis of a designer's discourse through interviews or writings about their own work is not the best approach to understand design practice. Lawson suggests that designers cannot be entirely trusted. He writes:

> 'First, designers are often not natural communicators with the written word. Second, they may be writing to impress rather than explain and are unlikely to reveal their doubts and weaknesses. Third, because designers are used to 'selling' their designs to clients they seem to develop a post-hoc rationalisation for the process which conceals all the blind alleys which they went down and shows only a logical inexorable progress to what they now wish to present as the 'right' answer.' (Lawson 2006, pp. 288–289)

Lawson (2006) also believes that designers are not used to thinking about the process. He acquired this insight, in part, from an experiment that he did with his first-year students of architecture at Sheffield University. It consisted of an exercise to develop a marble machine in which the students focussed on the process rather than on the product itself. To focus on the process rather than on the solution he chose a project that had nothing to do with architecture. The students were to develop a marble machine that would receive nine marble pieces in one end and deliver two, three and four pieces of marble at another end. Lawson asked the students to record and analyse how they made decisions during their work. After a few days working, the students developed reasonable solutions to the problem but decided to abandon the project and focus on a new one. It started to snow and the students decided to build an igloo in a park near the university. This new activity was a natural exercise of design that it did not present any previous requirements or constraints, unlike the exercises presented by the school. As the approach changed to a natural unself-conscious approach, good solutions arose from it. The process of design became natural to the students since they did not need to think about how they were making decisions during the design process. Instead, they just needed to create a solution to the problem in an introspective way, as they were used to doing. It demonstrated how uncomfortable designers are in talking and thinking about their own process of solving problems (Lawson 2006, pp.18–21).

Lawson's studies showed that even if the designers do not feel comfortable or simply cannot clarify their process it is possible to find common aspects of their 'design thinking'. According to him, the process can be demystified and, although it does not always follow the same sequence, it always entails some identifiable activities.

Analysis, synthesis and evaluation appeared to him as the main activities involved in the design process. Though the solution is usually seen as the final point of the design, Lawson shows that the development of the problem happens simultaneously with the development of the solution where neither of them—problem nor solution—can be considered the start or the end point of the process. No direction or right flow can be considered since all the possible ways of using these activities—analysis, synthesis and evaluation—can be considered (Lawson 2006, pp. 40–48).

After analysing several maps of the design process, Lawson created the one shown below:

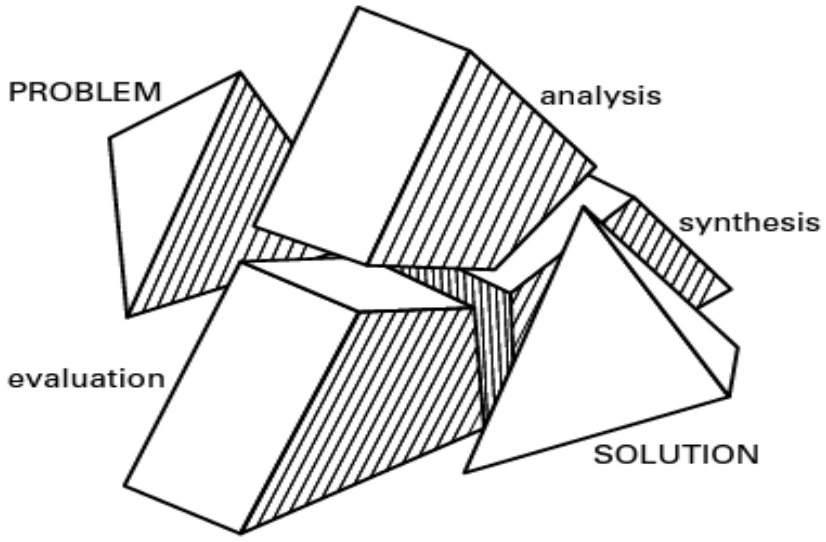

Figure 3: Map presented by Lawson suggesting that problem and solution are a reflection of each other in a process of negotiation where there is no right flow or direction. (in Lawson 2006, p. 49)

The problem is seen by Lawson as one of the main issues encountered in design activity. Though designers are usually known by the solutions they present, he states that it is usually the difficulty of the problems that distinguishes different design fields. Each field of design frames problems according to what is relevant to its activity and according to its specific knowledge (Lawson 2006, pp. 53–55). As an example, while working in a project for a house, the details and concerns developed by an architect would be different from the ones for an interior designer, even if they were working at the same project at the same time.

According to Lawson (2006), design problems are usually presented as unclear and the designers never seem to be satisfied with them as presented. How far the designer should delve into a problem is a tricky task for practitioners and students of design:

‘Designers simply stop designing either when they run out of time or when, in their judgement, it is not worth pursuing the matter further. In design, rather like art, one of the skills is in knowing when to stop.’ (Lawson 2006, p. 55)

He says that students often fail in their projects because they get lost while framing and developing a problem. Problems are complex and multidimensional, requiring a balance between different fields and issues.

Students should know how to manage these different issues avoiding questions that are unnecessary to achieve the solution.

The way problems are presented can be considered one of the differences that distinguish art and design. In art, the problems presented usually do not hold the constraints that design problems do. Artists may have clients but their clients typically give them freedom and **do not** bring a problem that is full of constraints. Though design and art hold several similarities, design is not just an art activity. This can be justified, in part, by the constraints placed on design and their influence in design solutions. According to Lawson, the main generators of constraints are legislators and clients, though designers themselves also generate them. The relevance of the constraint depends on the freedom given to, or taken by, the designer after it is presented. (Lawson 2006)

He goes on to argue that the credit for good design is usually taken by an individual because of his or her personal talent and creativity to develop good solutions. It is true that individual talent is important for a good design solution; however, at some point during the design process working in groups is also important. What starts as an individual concept is usually developed in groups, and this element of the design work is described by Lawson:

‘Clearly design depends upon both individual talents and creativity and the group sharing and supporting common ideals. Controlling the balance between

individual thought and group work is likely to be crucial. We can see the design team as having both individual and a group work space.' (Lawson 2006, p. 249)

In this context, studying designers such as Herman Hertzberger and John Outram at work, Lawson (2006) realised that they usually spend a considerable part of their time engaging in maximum contact with their staff, which would usually take place in their studio. Here, it is important to highlight that they were both architects running successful studios between 60's and 80's. Hertzberger was dutch and one of the responsibles for the structuralism during the 60's while Outram was british and his projects recognized for the use of polychromy and classical references. Lawson goes on to argue that it is also common for groups of designers who work together in a studio to develop design references and even a language together as they may visit exhibitions, watch lectures or even promote events inside the studio in which they will share design concepts. Though the group work is really important and valued by these designers, they usually also need periods of time in which they can develop ideas and reflect on the processes (Lawson 2006, pp. 253–254).

The clients are also an important part of the work of design processes; but, of course, they play a different role from of designers. They are part of the group not only because they are obviously the generator of the problem, but also because they can be considered a partner in the process. The clients usually not only present the problem, but also the constraints to solve it. The relationship between clients and designers facilitates consideration of

a problem as it arises. The clients not only present a brief of the problem at the beginning of the process, but also manage the constraints and the development of the problem with the designer (Lawson, 2006). Many designers tend to valorise the clients not only for presenting the initial brief, but also for enjoying the working relationship with them:

> ‘In contrast with the image of the designer so often portrayed by the magazines and journals, many designers do indeed enjoy close working relationships with theirs clients.’ (Lawson 2006, p. 255)

There are three views of the design process, Lawson argues, that should be considered, which he calls intentions, practices and aspirations. ‘Intentions’ consist of what should happen when design is done and this is represented by documentation of policies and procedures that describe the design processes, such as those produced by RIBA. ‘Practices’ are what actually happens in design practice and this is the consequence of the observation of the designer’s work from examination of the documents produced as well as from interviews with the designers. And ‘Aspirations’ are what participants would like to happen and that emerge from participants reflecting on the design processes involved, bringing into focus things that they didn’t execute but would like to do.

Lawson analysed the relationships of these three views of the design process in-depth. He tied the three of them together and drew conclusions about what would happen when each one of them is synchronised or

unsynchronized among the participants of a team. The outcomes of this are not relevant to this research, but these three views are important in building a general view of the process (Lawson 2006, pp. 260–261).

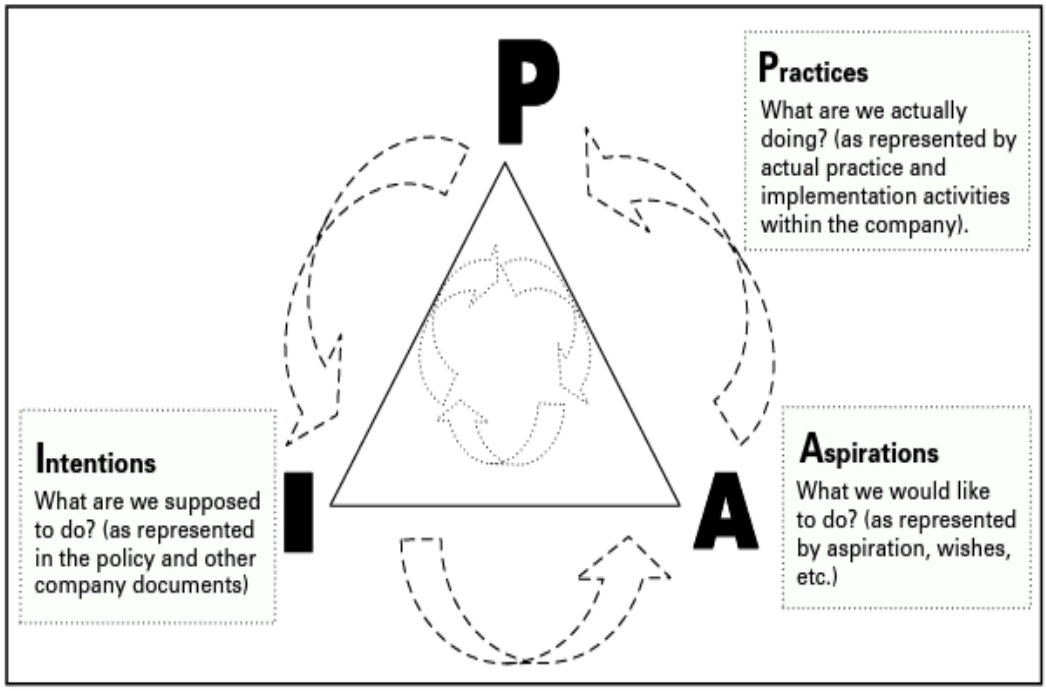

Figure 4: Three views of the design process (Lawson 2006, p. 260)

Here the design process appears as a negotiation between problem and solution. The problem view is identified as the form of needs, desires, wishes and requirements. On the other hand, the solution view is identified in terms of the physicality of materials, forms, systems and components. Conversation is an essential part of this process in which members of a design team share ideas that are significant to them. Sharing experiences through conversation gives social strength to the design groups that will develop design solutions through the sharing of common understandings and knowledge. Design develops as a recombination and modification of

elements taken from previously knowledge about solutions (Lawson 2006, pp. 270–275).

‘In essence designers tend to have relatively little theory that enables them to get from problem to solution. Rather they tend to acquire considerable stores of knowledge about solutions and their possibilities or affordances.’ (Lawson 2006, p. 272)

Lawson (2006) concludes that design is too complex to be described in a simple diagram since it involves several activities that span professions from engineering to art. Therefore, while exploring different areas of design he did not find a model that could fit them all; rather, he drew up a list of activities and skills. This list consists of formulating, moving, representing, evaluating and reflecting (p. 291). According to him, only designers can understand the activities and thinking that involves the design practice. Study of and reflection on practices by designers should help them to improve skill in design, and, thus, advance a practitioner’s career.

3.d. Review of Donald Schön

Donald Schön was an influential professor at MIT and was recognised for his studies on practical reflection and about the learning systems of professions. The book chosen in this research, *Educating the Reflective Practitioner: Towards a New Design for Teaching and Learning in the Professions* (1987), discloses aspects of practice and highlights the idea

that rational knowledge should be added to art and intuition as a way of framing practice problems across different professions.

The idea of reflection in action emerged as an important component of this research though it does not pertain to design itself. Rather, he refers to different professions such as psychology in tracing similarities found in all of them according to the way professionals think when they are developing a real problem. This study was cited by most of the authors consulted who write about design practice due to the aspects of design practice that it reveals. This includes the authors reviewed for this chapter, namely Cross, Cuff and Lawson. For the purpose of this research the following pages will highlight only the cases and conclusions related to design in differentiating this review from the previous ones, since the authors of the other books were talking exclusively about design.

Schön (1987) argues that professions are organised as the principal formal institutions in which professionals are trained to aid society by solving its problems. Though this dependency exists, the practice and credibility of many professions have been placed in doubt. He goes on to argue that the professions grew to deliver not only wrong and conflicting recommendations, but also inefficient solutions to public problems (pp. 2–3).

The discredit of professions increased as the professionals failed to show how their knowledge was contributing to the well-being of the society. Business and government interests were highlighted as among the causes of this failure as many professionals work in subordination to them. On the

other hand, the knowledge presented and applied by the professionals **did not** seem to correspond to the uncertainty characteristic of, and the unique character of, practical situations (Schön 1987, pp.13–14).

Research was conducted so as to produce knowledge that appeared as mathematical, rational and controlled. When the knowledge produced thus is used in practice it seems to be inappropriate to practical situations, which are characterised by uniqueness and uncertainty (Schön 1987, p.16). The practitioner has to consider the uncertainty, complexity and instability of practice:

> ‘An artful practice of the unique case appears anomalous when professional competence is modelled in terms of application of established techniques to recurrent events. Problem setting has no place in a body of professional knowledge concerned exclusively with problem solving. The task of choosing among competing paradigms of practice is not amenable to professional expertise.’ (Schön 1987, p. 19)

He goes on to argue that the split between research and practice emerged from the fact that professions were based on the use of technical rationality in which problem solving was carried on by use of scientific theory and technique (Schön 1987, p. 21). This was in part justified by the philosophical theory of Positivism that emerged in the 19th century, which emerged with the rise of science and technology used to facilitate human well-being. Positivism was a philosophy of science that recognises only what can be scientifically verified. According to this view, information derives

from logical or mathematical proofs in rejecting methaphysics and theism. At the height of positivism's influence, the modern universities emerged, which were based on technical rationality put into practice. Knowledge based in practice was not accepted by the positivists as it did not fit schemas of logic. Schön argues that added to this is the fact that during the World War II the investments in research increased and new institutions appeared based on the production of new scientific knowledge, followed by the launching of Sputnik which gave an extra impetus to national investment in science and technology (Schön 1987, pp. 30–40).

The uncertainty of practice and the rationality of science did not match, producing a crisis of legitimacy in the professions and weakening their ability to help society achieve its objectives and solve its problems. The problems in the real world are not presented as they should be solved. They are uncertain and problematic and require development and context framing, which will give them the necessary conditions by which exercise technical expertise (Schön 1987, pp. 41–49).

In this context, Schön (1987) presents the idea of reflection in action. It consists of a conversation with the situation that enables the practitioner to correct his mistakes and relearn through practice knowledge. Instead of a technical expertise, the practitioner should use a reflective talk with the situation as a way of facing the threat of uncertainty present in practice. (Schön 1987, p. 69) He notes:

‘Through reflection, he can surface and criticise the tacit understandings that have grown up around the repetitive experiences of a specialised practice, and can make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience’ (Schön 1987, p. 61).

Schön (1987) uses several examples to illustrate the concept of reflection in action. A case study about a student and a senior architect in an architect school is especially interesting for our purposes. Studio master Quist reviews the work of his student, Petra. As Quist analyses Petra’s work, he restructures the problem. Each decision taken is explored in multiple ways based on views drawn from his repertoire. The exercise is evaluated and explored in a reflective conversation that determines the constraints and potentials of the problem given. From here the problem is further appreciated, reinvented and redrawn (Schön 1987, p.104).

The reflective talk with the situation appeared as a natural and spontaneous process to practitioners for which reflection in action assumes the role of art while dealing with the problem. Standard techniques are not used in this process as the situations presented are unique and problematic, demanding development and reframing of the situation. By use of its repertoire the practitioner tries to reshape the problem in a way he feels will best aid in finding a solution. When reframing of the situation is successful it leads to several new reflective conversations with the situation:

‘It is our capacity to see unfamiliar situations as familiar ones, and to do in the former as we have done in latter, that enables us to bring past experience to bear

on the unique case. It is our capacity to see-as and do-as that allows us to have a feel for problems that do not fit existing rules.' (Schön 1987, p140)

Although reflection in action appears as something inherent to the design process, Schön states that it isn't clearly shown by the designers. This might be because the kind of conversation with the situation emerges as a feeling for how the situation develops. Schön asserts that if Quist, the senior architect, reflected on this process it would be easier for the student as well as for any observer to detect the fundamental structure that underlies the process of design (Schön 1987, p. 104).

Schön suggests that reflection in action is to be used not only by practitioners, but also by clients and researchers. With clients it brings a new kind of contract where client and professional will share control of the situation, relinquishing the common game of power about who is controlling the situation. Professionals often reject this kind of relationship with the client because it unmasks uncertainties and vulnerabilities, which eliminates the professionals' control over their clients. On the other hand, clients might reject it due to their wish to solve the problem quickly or just because they are attracted to the professional mystique and authority (Schön 1987, pp. 298–305). Although this relationship may be rejected by clients and professionals, it brings a new perspective to the relationship, one in which the role of the client is reframed as it becomes essential to the development of the situation.

Meanwhile, in the case of researchers, he suggests that reflection in action is practiced by practitioners who have become researchers, creating a relationship of collaboration between practice and research. In this case the research would rely on the experiences of practice, which gives the researcher an inside view of the practice. This model rejects the traditional use of professional knowledge in which practice is based on knowledge in a unilateral way. Reflective research might be one of the ways of reducing the gap between practice and research (Schön 1987, pp. 310–323).

Schön (1987) concludes that professions are used as a way to manifest political and intellectual views and interests. Though it might be Utopian, the use of the reflective conversation by professionals might open up a new role for the professions in society based on a ‘cooperative inquiry’ within adversarial contexts in which the professionals would become the agents of society’s reflective conversation with the situation.

4 DISCUSSION

This chapter will focus on analyses and comparisons of the reviews presented in the previous section. Content analysis will be applied to the texts reviewed as a way of comparing them according to the dualities presented by Cuff (1992). Consideration is given to the individual and the collective, architecture as decision making opposed to sense making, design and art versus business and management, and specialists and generalists.

4.a. First: Duality between the individual and the collective

The first duality about the individual and the collective is probably the one that can be found most explicitly in all the texts. Cuff (1992), Cross (2011) and Lawson (2006) adopt similar approaches to this as well as similar methods to demonstrate it. They provide case studies of real design practice in which design was usually developed in groups.

Here the idea of designers playing a central role in the design process emerges. However, the authors analysed challenge the concept of designers working alone, highlighting that they are usually part of a team. On the other hand, they confirm that there is an image associated with the designers, one in which they are seen as artists developing their work alone and without constraints or judgements. From the analysis of Cross (2011) and Lawson (2006), this image is, in part, created by the designers

themselves, who believe that keeping the art as a central point of their work will omit judgements of their work while retaining the mystery surrounding their activity and, so, the exclusivity of their solutions. This posture reinforces the culture of the individual but, as argued by Lawson (2006) and Cuff (1992), although the design process that might emerge as an intuitive activity is neither mysterious nor individual. Here individual talent shouldn't be ignored. A good concept might emerge from an individual but it will be followed by its development, which is usually made in groups.

Furthermore, Cross (2011) highlights the role of the team as a collaborative process that brings new perspectives about problems and solutions. He goes on to argue that it is very important for the group to establish rules and goals for each design exercise. Doing so will establish the boundaries for their work, thus avoiding distractions with secondary problems. Cross argues that working in teams might be better than working alone. When a designer is working by him/herself he/she acts the part of a team, playing all the roles expected in a design task. He notes:

> 'He oscillates between overviews and technical details, between functional aspects of design product and issues related to human factors. He thinks of features, product identity and aesthetic along with stiffness, strength and ease of production. Team members do the same, but they can let a colleague answer a question they raise, or pick up someone else's line of thought and build on it. The single designer has only him or herself to rely on, and he or she must act as a tram and give all the answers while also asking all the questions.' (Cross, 2011, p. 119)

Accordingly, Lawson (2006) also points out the advantages of working in teams and, as Cross (2011) does, he highlights the conflicts that might emerge from the relationship between the participants. In this sense, a good contact between the members of a group can manage the conflicts and help to achieve a good design solution. Lawson (2006) argues that the construction of common meanings, languages and concepts among the members of the group might be useful. According to him, sharing a common understanding of the situation is one of the ways to work successfully in a design team:

> ‘One of the most significant factors in the formation of effective groups seems to be the development of group norms. Such norms may include conventions of dress, speech and general behaviour and serve to suppress the individuality of members in favour of an expression of attachment to the group.’ (Lawson 2006, p. 244)

Another view that should be considered is that of the reflective talk presented by Schön. It can be considered a means by which teams can successfully treat the problem. It consists of a reflective conversation with the situation that, according to him, allows for correcting mistakes and reframing the problem. A team can practice this kind of conversation with the situation once it includes the knowledge acquired in practice in the given situation given as well as the opportunity to learn about and reflect on each situation, which builds even more knowledge base into practice.

Besides designers, who are obviously participants of the design teams, the role of the client emerged as an essential part in the teamwork as it was considered by the four authors reviewed. Cross (2011, pp.75-77), Lawson (2006, pp. 254-256) and Cuff (1992, 81-83) value the involvement of the client not only in the briefing, but also through the design process. According to them, good design solutions are usually a consequence of good clients who are actively involved in the process as they help the development of problem and solution.

Schön also considers the importance of clients in the design process and suggests that professionals should allow their clients to talk about the situation. According to him, this kind of participation of the client in the process weakens the authority of the professional and reduced the mystery surrounding some professions, given that the client helps to reframe and reflect on the situation, becoming an essential part of the process.

It can be inferred from the analysis of Cuff, Cross, Lawson and Schön that the disjunction related to the individual and the collective is present in various fields of design. The individual designer emerges as a central player in the design process. An individual talent is usually present that leads the development of a design problem, generating concepts that will be solved in groups.

Here, considering ‘countless voices’, one of the main characteristics of design problems pointed out by Cuff (1992, pp. 72-83), might be helpful. She argues that architects’ decisions during a project are influenced by

external determinants, such as social and economic forces. Not only the clients, but also regulatory bodies and other professionals are called in to contribute to consideration of specific issues of the project. Cuff suggests that the architect's office should work as the coordinator of all these voices, managing the input of each of them.

Furthermore, Cuff (1992) and Cross (2011) show that this aspect of hiding the process of design is a common practice of practitioners. According to them, designers seem to believe that this is a way of protecting their unique way of solving problems.

Although it is possible to determine that design is usually an activity developed in groups, an image appears to have emerged of design as an individual activity. This comes, in part, from the success of good design solutions that are credited to one individual and from the aim of many practitioners to keep secret this idealised image about their profession. A senior architect will always be the central part of the process, but is essential for the designer to acknowledge that his/her practice is a collective activity.

4.b. Second: Duality between architecture as decision making opposed to sense making

According to Cuff, a belief is dominant that design is an activity in which solving problems stands at the centre. Therefore, problems will be easily identified and solved. However, Cuff's studies about the practice of

architecture show that the important skill for a designer is ‘sense making’ and not ‘decision making’. She affirms:

> ‘The notion of sense making implies a collective context in which we must make sense of a situation, inherently social, interpret it, and make sense with others through conversation and action in order to reach agreements.’ (Cuff 1992, p. 254)

The same idea is present in the works of Cross (2011) and Lawson (2006) where they describe design practice. Both defend the idea that the process of design is not direct; neither is it a model that should always be followed. They note that instead of easily making decisions, designers should develop the problem and frame it according to what they are able to draw from the situation. In addition, the idea of ‘decision making’ relies on a certain objectivity and rationality that can also be found in the design process, although each situation is unique and should be thought out and solved in an exclusive way.

Cross (2011, pp.121-135) argues that the problem as it is presented marks just the beginning of an exploratory process. This belief is in line with the view of sense making as presented by Cuff (1992, pp. 155-258).

Accordingly, Lawson (2006, pp. 260-275) presents the development of the problem as a facet of design. In this case, the constraints that emerge from a design problem are presented as a central point. He argues that the constraints, which are mainly generated by clients, might lead to problem solving as they might introduce the frame on which problems should be

developed. In this process, Lawson argues that problem and solution should be developed together in a collaborative and explanatory process. Lawson also argues that it is the existence of constraints that distinguishes design from art. Art practice and problem solving do not contain complex and multiple constraints such as those found in design practice.

Furthermore, the reflective conversation presented by Schön also reinforces the idea of sense making. According to him, the practitioner should talk about the situation as a way of framing the problem. As the practitioner talks about the problem he is working on several important aspects of it can be identified and he/she can reshape the situation. This activity of talking back with the situation usually emerges as a natural process to practitioners. This might be one of the characteristics of their work that are hidden since it appears as an unconscious facet of practice, not following any standard use of techniques. Instead of a pattern the practitioner tries to find a solution to the problem using the repertoire acquired in past situations.

Cross, Lawson and Schön share common views about the duality of decision making opposed to sense making presented by Cuff. They agree that the problem is presented unclearly and incompletely and should be developed. This approach is close to the idea of ‘sense making’. However, Schön admits that design might be a natural process without use of standard techniques, while Cross and Lawson try to reinforce the idea that design is a precise activity that follows set procedures.

Curiously, Lawson and Cross are designers themselves and both deny the natural and unconscious way in which most designers carry out their activity. Their work shows that this is a way of hiding design activity as they identify procedures and stages that are common to all design fields. However, this does not appear to be accurate as they present common stages and procedures but also assume that there is no determined order to the stages they consider. This might be seen by Schön and by other designers as a natural facet of design. Schön (1987, pp. 99-104), who is an outside voice, apparently admits that designers might work in a way such that they do not think of the process. It is important to highlight here that though he assumes some hidden characteristics of the design process he also demonstrates some common stages that all designers go through in their design process.

4.c. Third: Duality between architecture as design and art versus business and management

Cuff's (1992) analysis of architectural practice demonstrates that a schism exists between art and business. According to her, architects usually take on activities linked to the drawing board. They take history courses and study theory linked to design, denying the role of management and business. On the other hand, she observes that business and management are an essential part of successful projects. Although architects do not

always admit this facet of their activity, Cuff states that it is always present in the development of good projects.

Lawson (2006) and Cross (2011) reinforce the role of business and management in design practice but in a slightly different way. They assume that misunderstandings are present between business and design. Although designers seem not to appreciate business activities related to their work they seem to be aware of the contributions of these fields to their practice. Here, Cuff (1992) appears not to consider that designers recognise the importance of these areas in the development of their work.

Here a consideration of the approach given by Cecilie Schjerven (2010) might be helpful. She writes:

> '...design management appeared to fill the bartering between designers and those parties, including client groups, which designers encounter in a project setting'. (Schjerven 2010, p.29)

Schjerven is a resercher at Lund University in Sweden and has a relevant research about design management and the role of culture in the relationship between designers and their client counterparts. She demonstrates that a misunderstanding between design and business remains but several changes have occurred over the last decades. Design management appears to have filled the need for bartering between designers and those parties, including client groups, that designers interact with in a project setting. According to her, design and management are complimentary disciplines. She considers problem solving in design similar

to problem solving in management since both involve a process (activity = process). She has drawn the following table:

design concepts	management concepts
design is a problem-solving activity	process: problem solving
design is a creative activity	management of ideas: innovation
design is a systemic activity	business systems: information
design is an activity of coordination	communication: structure
design is a cultural and artistic activity	consumer preference: organisational culture: identity

Figure 5: Table comparing design and management concepts (In Schjerven 2010, p.41)

She goes on to argue that MBA courses have recently included the study of design principles. Design became important to some aspects of business as can be seen in the passage below:

'From being considered 'merely a service to marketing and engineering' design became recognised as a strategic resource where designers represented the 'vital link between producers and consumers.' (Schjerven 2010, p.38)

Other studies reinforce the close relationship between business and design. According to Matthews (2011) recent studies research shows that companies that used design in their business performed better economically:

'Research by the UK Design Council on the performance of firms and the impact of design on firms' performance found that over a ten-year period of analysis, the benefits of effective use of design include an improved share price performance and therefore greater shareholder returns' (Matthews 2011, p.3)

In this sense, Cross (2011) and Lawson (2006) do not always highlight the activities as belonging to management or design; they simply include them as essential parts of the design activity. This can be considered a step further from Cuff, considering that her work was done in 1992, a time when it appeared to be essential to highlight the fact that management and business were not considered by designers.

Considering Schjerven's approach, Lawson (2006), Cross (2011) and Schön highlight some aspects of the design activity that can also be taken as management and business. Here the main aspects that arise were the relationship with their clients and other counterparts and the relationship between the members of a design team.

Managing the client's needs and expectations might not be an easy task. Good solutions always appear to emerge from a good relationship between designers and clients. It seems that in successful projects the clients are not only the generators of problems and constraints, but also members of the design team as they might help the development of the problem and thus the solution. This face of design practice, the participation of external voices in the design process, might be one of the issues that promotes design thinking as part of studies of management, which has recently come under consideration.

The relationship between the members of a team, pointed out by Lawson (2006) and Cross (2011), can also be seen as management. In the process

of designing in teams, issues related to leadership and management appear as relevants to the process.

Another relevant point about Lawson's work that should be taken in consideration is the influence of constraints within the development of a design problem. He highlights that new constraints arise during the design process. These new constraints might change the course in which a design problem is being developed. Here he reinforces the idea that the design process is constantly changing and that problem and solution should be developed together as new issues are constantly brought into the process. He goes on to argue that designers should be aware of this facet of design problems, and managing new situations and constraints during the process emerges as an essential activity.

In this case, management and business cannot be seen as opposite to art and design itself as they are, in fact, a central part of the design process. Business and management concerns are a natural part of design thinking, which might indicate that designers are not aware that they need to have a good understanding of these areas. In this sense, understanding that business and management play an important role should help designers to develop those skills.

4.d. Fourth: Duality between the image of the architect as specialist opposed to generalist

Cuff argues that the duality between specialists and generalists should be debated. She considers it essential that architects should have a broad-based formation. But she also understands that specialisation should be taken in consideration. According to her, architectural practice reveals that practitioners typically become experts in one specific field of architecture after a few years of professional practice. She argues that this expertise could be improved in the final years of an architect's formation. On the other hand, she states that although specialisation is necessary for senior designers, the broader formation of designers should also be stressed in the early phases of their career.

Considering her approach about the duality between specialists and generalists, some issues pointed out by other authors analysed in this research enrich the discussion. It was clear that within the process of design and problem solving several areas of knowledge were necessary. When Lawson (2006, pp.88-90) and Cross (2011, pp.91-113) admitted the importance of team work, relevant points about this disjunction are raised. According to them, a design team might be necessary not only because of the convenience of having different people helping to solve a design problem, but also because of the complexity of some problems. Complex problems might need experts in certain fields. In this sense, complex problems might call for experts in specific fields, which makes manifest the

importance of expert designers. Here it is important to highlight that, according to Cross and Lawson, teamwork also showed that the members of a team should be able to work together in a productive way. In this sense, they should bring aspects of management and leadership to their work, which makes them generalists according to this point of view.

Recent works about the education of designers, such as Ozkaynak (2011), reinforce the importance of imparting a broader knowledge within design courses. She shows that the design process remains the same while the methods and techniques constantly change. As shown above, the process of design involves different areas, including not only areas related to art and design itself, but also areas linked to management and business.

So, it can be inferred from a comparison of the texts that the duality between specialists and generalists is still present not only in architecture, but also in other fields of design. While being an expert on a specific area might bring benefits for designers in their project work and careers, having a broad base knowledge appeared to be essential as well. Probably the education of designers is the facet of their training for which changes are most essential. Schools should provide a broad knowledge about the process of design and about external fields in which design is involved, but, at the same time, they should guarantee that, during their formation, students can acquire real practice so as to aid them in choosing a field in which they want to develop their expertise.

5 CONCLUSION

5.a. Answer to research question

RQ1: What is the perception of professional design practice as revealed in the literature written about the design process in the United Kingdom?

According to this study, professional design practice can be seen as a multi-task activity usually developed in groups. It cannot be presented as a generalized model as the methods and techniques may vary. However, it is possible to identify some common characteristics of design practice across its different domains. These characteristics appear to be related to the way designers frame and develop their problems. In this context, the main characteristics were found to be the importance of the relationship with the client and other external forces, the role of management and business and design being developed in teams.

Furthermore, designers, in many cases, do not seem to be familiar with their process. Apparently, they simply go on a design task without following any specific method or criteria. The perception of the practice that the authors presented was based on their observation of practice as what designers say does not seem to correspond to actual practice. This fact reinforces the idea that designers believe that they might develop their solutions in an intuitive way, not being completely conscious of the process. Designers usually describe their activity as natural and linked to the arts,

one involving a natural process of creation. However, this study shows that the knowledge used by designers goes beyond art and design itself. The design process requires knowledge in areas such as business and management.

5.b. Contributions of the study

The present research presented a view of how designers work based on recent researches about the design process in the UK. In this sense, the way designers solve problems emerged as a relevant aspect of their work and so was more fully described during the text. It showed that flexibility was essential as good solutions depended on the way designers manage the methods they use as well as their ability to create a new approach to solve each different problem. Although the process of solving problems appears to be the same, the methods used to solve them are not. Key points and phases of problem solving could be identified; however, it is not possible to present a precise view of what the design process is. In this respect a few aspects presented in this research should be highlighted.

First, there is the development of the problem as given. Cross (2006) showed the shortcomings apparent in the way problems are presented, the development of which is essential to a good design solution. Meanwhile, Lawson (2006) shares the same view about the importance of the development of problems, but he highlights the importance of constraints in this process. Schön, on the other hand, presents the idea of reflection in action as a way that practitioners talk back with the situation. It consists of

an internal conversation that might give rise to an awareness of new aspects of the design problem that were not presented or considered. In this context, Cuff's (1992) observation of architecture practice centres on the idea of design being developed in teams. This idea is confirmed by Lawson (2006) and Cross (2011) whose works reinforce the importance of teamwork in design.

Furthermore, the role of management and business also emerged as important for problem solving. They are important when designers **need** to manage their teams and schedules and to help designers work with the constraints and external forces that are part of the process. These external forces were also extensively cited by the authors with respect to the relationship with the clients. Here the clients were considered to be not only the generators of problems and constraints, but also an important part of the team. Cuff (1992) observed that good buildings were usually developed with the help of their clients, as these individuals were an active part of the design process.

From the reading and comparison of texts about the design process it was possible to identify the main components of the design process. Apparently, designers themselves are not familiar with these components of their process. This research reinforces that the knowledge about the design process and its components by the designers might help the improvement of the profession. In this sense, design schools should impart a better understanding of the process as a way of helping designers to improve their

knowledge about the design process and, so their work. Curiously, study of the design process is considered important today for other fields that are not linked to design activities. Recent studies about management and business note the importance of design thinking. The aspects of problem solving described in this research are the main elements identified.

5.c Limitations of the study and future research

The study considers a limited frame as it is focused on a particular problem. First, considering that the study is about the practice of design a simple analysis of texts might be weak and the insertion of case studies and fieldwork results could make the arguments more consistent. In this sense, the analysis of designers' conversations, as showed by Oak (2011), emerges as a way of discovering aspects of the practice of designers since communication and negotiation are central to design.

Second**,** although other professions recognise the relevance of the design process and thinking and are using it to develop their fields, designers themselves are not always familiar with the process of design. A gap appears to exist between the theory and the practice and the study of the roots of design seems to be relevant as well.

Third, as design thinking has been studied by other areas of knowledge such as management and business, considering the approaches given by these areas might also be helpful to improve the knowledge about the design process.

Finally, some questions emerge from this study. Focusing on the image of the designer/design, is it different viewed from outside the profession? How is this image constructed? And does this image interfere with the practice of design? How do other areas see the design profession and how do they use the knowledge about the design process?

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